

SMCOE Green Career Awareness Course

AGRISCIENCE

Solutionary Phase	Problem Cycle #2
Lesson # and title	Lesson 8: Human Population & Food
Duration	45 minutes

Lesson Overview

Students will be introduced to the relationship between human population and food availability. Students will engage with text sets and data graphics to draw connections between limited food production and a growing global population.

Learning Objectives

- Analyze graphs and text sets to gain understanding of the relationship between limited food availability and a growing global population.
- Match proper graphs and descriptions based on the information present.
- Synthesize information presented in text sets by making “kid friendly” graph descriptions.

Content Standard(s)

CA NGSS

Human Impacts on Earth Systems - Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)

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College and Career Connection(s)

Food production is closely dovetailed with the Agriculture Industry. This lesson exposes students to the role that farmers play in feeding the global population through plant and animal production.

Equipment, Instructional Resources, and Materials

- [Graph Analysis Activity](#) (Directions, Materials, Answer Key)
- Graph Analysis Packet (1/group of students). Each Graph Analysis Packet should contain:
 - Graph A, B, C, and D printed out (optional: laminate for a reusable lesson material)
 - Definition 1 - 9 printed out (optional: laminate for a reusable lesson material)
 - Be sure to have the graphs and the corresponding definitions cut/separated before distributing to students (cut along the marked line on each page separating graphs/definitions)
 - Have all graphs and definitions mixed up in a zip lock bag for easy distribution
- Pen/paper for students

Suggested Student Grouping

Students are recommended to work in groups of 3-4 (pairs will also work).

Vocabulary

- Agriculture - The practice of growing plants for food, clothing, animal feed, and other resources humans need or desire. It also includes raising domesticated animals (livestock).
- Atmosphere - A thick layer of air that surrounds the Earth, supports life on Earth, and protects living things from the sun's harmful radiation.
- Biodiversity - Biological diversity is the variety of life in an area. Examples include the variety of individuals in a species, the variety of species in an ecosystem, and the variety of biomes or species on earth.
- Carbon - An element that is in all living things (e.g., humans, animals, and plants) and many nonliving things (i.e., rocks, soil, water, and our air/atmosphere). Atmospheric carbon is often attached to oxygen in the form of carbon dioxide.
- Carbon footprint - The amount of carbon dioxide and other greenhouse gases that a person or group of people puts into the atmosphere from their use of fossil fuels.
- Carbon sequestration - The process of capturing and storing carbon dioxide and other forms of carbon from the

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atmosphere. The natural process of sequestration stores carbon in soil and bodies of water. The human-designed processes using technology to capture and store carbon.

- Carbon release - The process of carbon being released from the soil. This happens naturally as soil organisms breathe (respire), and can be sped up through human activities such as tilling or plowing.
- Climate change - The global long-term change in temperature and weather patterns due to increases in atmospheric carbon dioxide, mostly due to use of fossil fuels.
- Conventional/degenerative agriculture - Industrial practices of farming which include large single-crop farms, intensive tiling and irrigation, and the use of synthetic fertilizers, pesticides, and herbicides. This way of farming is very productive, but requires high amounts of energy, adds toxins to the soil, and increases carbon release from the soil rather than carbon sequestration (capture).
- Decomposer - Any organism that breaks down dead or decaying organic matter such as dead animals, fallen trees, or leaf litter.
- Ecosystem - A place where all the living things (plants, animals, microorganisms) interact with each other and with nonliving parts of their environment (water, sun, temperature, rocks and soil).
- Erosion - When rocks, soil, or other landforms are gradually worn down by ice, water, or wind.
- Fertilizers - Any substance, natural or man-made, added to soil to increase the level of nutrients it contains and speed up plant growth.
- Greenhouse effect - The natural process of the Earth's atmosphere trapping heat from the sun. Human use of fossil fuels has increased the amount of carbon in the atmosphere, leading to more of the sun's heat being trapped (global warming).
- Herbicides - Chemicals used to kill unwanted plants. Also known as weedkillers
- Microorganism - A living thing such as bacteria or fungi that is too small to be seen without the use of a microscope or other magnification.
- Macro-organism - A living thing that can be seen by the naked eye.
- Monoculture - The practice of growing or producing only one crop, species, or animal in the same place at the same time.
- Pesticides - Chemicals used to kill unwanted organisms such as insects, rodents, plants, or fungi.
- Photosynthesis - The process by which plants use the sun's energy to create carbon-based sugars from carbon dioxide and water.
- Polyculture - The practice of growing or producing multiple crops, species, or animals in the same place at the same time.
- Regenerative agriculture - Farming and grazing practices that focus on restoring soil health and biodiversity, and sequestering (capturing) carbon in the soil.
- Soil - The material on the surface of the Earth in which plants grow. It is a mixture of eroded rocks, minerals, and organic matter. It holds water and air, provides nutrients and structural support to plants, and supports a diverse ecosystem of living micro- and macro-organisms.

The Lesson

Preparation

1. Review the [Lesson 8 - Graph Analysis + Directions/Key](#)
2. Create Graph Analysis Packets for each group. Each Graph Analysis Packet should contain:
 - a. Graph A, B, C, D, E, and F printed out
 - b. Definition 1 - 8 printed out
 - c. Be sure to have the graphs and the corresponding definitions cut/separated before distributing to students (cut along the marked line on each page separating graphs/definitions)
 - d. Have all graphs and definitions mixed up in a zip lock bag for easy distribution
3. Decide if you would like students to do the EXIT TICKET (assessment) - Have students choose 1 graph from the activity and turn it into “kid friendly” language. Students should describe the graph and what it means using 1-2 sentences.

Lesson Procedure

Link to Lesson Slide Deck: None

Activity/Task	Description	Time (min)
Graph Analysis	<ul style="list-style-type: none"> • Divide students into groups of 4, have students sitting in their clusters facing each other. • Hand out 1 Graph Analysis Packet to each group. Each Graph Analysis Packet should contain: <ul style="list-style-type: none"> ○ Graph A, B, C, D, E, and F printed out ○ Definition 1 - 8 printed out ○ Be sure to have the graphs and the corresponding definitions cut/separated before distributing to students (cut along the marked line on each page separating graphs/definitions) ○ Have all graphs and definitions mixed up in a zip lock bag for easy distribution • Have students work in their groups for 10-15 minutes trying to match the 	10-15

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	<p>proper graph/definition pairings. Encourage students to pull key information out of the definitions to help them pair the correct definition with the correct graph.</p> <ul style="list-style-type: none"> ○ Note: There are more definitions than graphs provided, students should have 6 definitions paired with 6 graphs and have two “unrelated” definitions that have no matching graph. ● Instruct students that when they are finished, raise their hand to have the teacher come by and check their work. Redirect students to try again if they have improper pairings. 	
Review/Correct Graph Analysis Activity	<ul style="list-style-type: none"> ● Review/elaborate on each graph/description as a class. See graph analysis document for answer key. 	5
Discussion Questions	<ul style="list-style-type: none"> ● After reviewing the correct graph/definition pairings as a class, instruct students to work in their groups to answer discussion questions (discussion questions located on a different page). ● 	15-20
Review/Correct Discussion Questions	<ul style="list-style-type: none"> ● When students have completed the 6 discussion questions, review the answers (included in the key). 	5
Exit Ticket (Assessment) Optional	Have students choose 1 graph from the activity and turn it into “kid friendly” language. Students should describe the graph and what it means using 1-2 sentences.	5-10

Assessment
Have students choose 1 graph from the activity and turn it into “kid friendly” language. Students should describe the graph and what it means using 1-2 sentences. Students should submit their exit ticket before the end of class.